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BRITISH MUSEUM (NATURAL HISTORY)

INSECTS OF SAMOA

AND OTHER SAMOAN TERRESTRIAL ARTHROPODA

PART II. HEMIPTERA

FASC. 2. Pp. 47–80

CERCOPIDAE

By V. LALLEMAND, M.D.

CICADIDAE

By J. G. MYERS, Sc.D.

AQUATIC AND SEMI-AQUATIC HETEROPTERA

By PROF. TEISO ESAKI

WITH THIRTY-EIGHT TEXT-FIGURES





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Although a monograph, or series of papers, dealing comprehensively with the land arthropod fauna of any group of islands in the South Pacific may be expected to yield valuable results, in connection with distribution, modification due to isolation, and other problems, no such work is at present in existence. In order in some measure to remedy this deficiency, and in view of benefits directly accruing to the National Collections, the Trustees of the British Museum have undertaken the publication of an account of the Insects and other Terrestrial Arthropoda collected in the Samoan Islands, in 1924-1925, by Messrs. P. A. Buxton and G. H. E. Hopkins, during the Expedition of the London School of Hygiene and Tropical Medicine to the South Pacific. Advantage has been taken of the opportunity thus afforded, to make the studies as complete as possible by including in them all Samoan material of the groups concerned in both the British Museum (Natural History) and (by courtesy of the authorities of that institution) the Bishop Museum, Honolulu.

It is not intended that contributors to the text shall be confined to the Museum Staff or to any one nation, but, so far as possible, the assistance of the leading authorities on all groups to be dealt with has been obtained.

The work will be divided into eight "Parts" (see p. 3 of wrapper), which will be subdivided into "Fascicles." Each of the latter, which will appear as ready in any order, will consist of one or more contributions. On the completion of the work it is intended to issue a general survey, summarising the whole and drawing from it such conclusions as may be warranted.

A list of Fascicles already issued will be found on the back of this wrapper.

E. E. AUSTEN,
Keeper of Entomology.

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Insects of Samoa. Part II Hemiptera, fasc. 2. pg. 47-80. Cercopidae by V. Lallemand, Cicadidae by J.G. Myers, Aquatic and semiaquatic Heteroptera by Prof. Teiso Esaki. 38 figs. Preis: 2 s 6 d.

Part VI Diptera. fasc. 2. Pp. 23-108. Nematocera by F.W. Edwards, Cecidomyiinae by H.F. Barnes. 24 figs. Preis: 5 s. Part VIIOthers Orders of Insects. fasc.2, Pp. 45-76. Plectoptera by R.J. Tillyard, Siphonaptera by P.A. Buxton, Thysanoptera by Richard S. Bagnall. 8 figs. Preis: 2 s 6 d. London, British Museum Nat. Hist., 1928.

Als neue Arten der Cercopiden werden beschrieben Clovia swezeyi, Cl. juddi, Cl. biformis, Cl. bryani, Cl. armstrongi, Cl. buxtoni, Aufidus hopkinsi, Au. samoanus, Unter den Cicadiden wird die Gattung Moana mit der Art expansa als erste endemische Cicadidengattung aus Polynesien beschrieben. Unter den Wasserwanzen sind neue Arten Microvelia samoana, Limnogonus pacificus, L. buxtoni, L. hopkinsi, Anisops leucothea.

Die nematoceren Dipteren von Samoa waren bisher so gut wie unbekannt, nur Culiciden und 5 Tipuliden waren bereits früher beschrieben. Jetzt steigt die Zahl der bekannten Arten auf 100, meist indoaustralischen Ursprungs. Zusammenhänge mit den Faunenbezirken von Australien, Neuseeland und Südamerika sind nicht vorhanden. Der Unterschied gegenüber der Fauna von Fiji ist beträchtlich, sodass man annehmen kann, dass viele Arten Samoa direkt und nicht auf dem Wege über die Fijiinseln erreicht haben. Nur 4 Genera sind endemisch für den Pacific. Für die Besiedlung der Inseln mit Insekten spielt die Verschleppung mit faulenden organischen Stoffen und der Transport durch Wind die grösste Rolle. Sciara vadicum Brunetti greift Lilienzwibeln an. An Culiciden sind 7 Arten von Samoa bekannt: Aedes argentens Poir., A. variegatus Dol. var. pseudoscutellaris Theo., A. kochi Dön. var. samoan Grünb. A. vexans Mg., Culex samoanensis Theo., C. annulirostris Skuse und C. fatigans Wied., letztere Art erst in neuerer Zeit eingeschleppt. Von Ceratopogoniden sind 16 Arten bekannt. Davon werden 11 als neu beschrieben: Forci.

Ceratopogon peregrinator, Stilobezzia samoana, Bezzia sexspinosa. ~~Eine~~ *Cecidomyiden waren bisher von Samoa überhaupt noch nicht bekannt. Beschrieben werden: Lestodiplosis sp., Allobremia upolui, Liebeliola bifurcata, Phaenepidosis auriculata. Von Flöhen kommen nur 3 Arten vor: Pulex irritans, Xenopsylla cheopis, Ctenocephalus felis. Unter den Thysanopteren sind besonders die an Ficus Gallen bildenden Arten beachtenswert. Bagnall behandelt auch die ausserhalb Samoas vorkommenden Ficusgallen-Thripse. Als neue Gattung wird Dimorphothrips mit den Arten microchaetus und solitus von den Tonga-Inseln beschrieben. Neue Arten sind ferner Gynaikothrips hystrix von Tonga und G. hopkinsi von Samoa, Euoplothrips buxtoni und Eu. incognitus von Tonga und Eu. uncinatus von Samoa, sowie Rhaebothrips major von Samoa.*

Zacher
(Berlin-Steglitz).

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INSECTS OF SAMOA

Part II. Fasc. 2

HEMIPTERA

CERCOPIDAE

Par V. Lallemand, M.D., Uccle, Belgique

(Avec 10 Texte-figures)

I. Introduction

Le genre *Clovia* est répandu en Afrique, en Asie et en Océanie à peu près entre les latitudes 30° N. et S. ; les espèces sont nombreuses en Océanie. Malheureusement les homoptères et spécialement certains groupes, dont les Cercopides, ont été peu recherchés dans plusieurs de ces îles et les rapports entr'elles des différentes espèces de ces régions sont encore assez difficiles à établir. Une de celles ci-dessous décrites *C. juddi* est voisine de *C. insignis* Distant, recueillie sur l'île Elisabeth (ou Henderson), de *C. oceanica* Jacobi, trouvée dans les îles Tonga, et également de deux autres (*C. rapana* de l'île Rapa et *C. sociabilis* de l'île Tahiti) * ; ces quatre *Clovia* constituent un groupe bien distinct, ce sont probablement quatre formes locales d'une seule et même souche.

Le genre *Perinoia* est propre a l'Océanie, la *P. caput-ranae* (= *birarensis* Kirkaldy) a été trouvée en Nouvelle-Guinée, Nouvelle-Bretagne et enfin dans les îles Samoa.

Le genre *Aufidus* est également spécial à l'Océanie ; la plupart des espèces décrites proviennent de la Nouvelle-Guinée, qui parait être le centre de dispersion ; quelques unes ont été recueillies dans les îles environnantes â Aroé, Birara (Nouvelle-Bretagne), une sur l'île Gilolo (Moluques), et enfin deux autres, provenant du Queensland, ont été décrites par Kirkaldy ; pour ces dernières, il

* *Ann. Mag. Nat. Hist.* (10) I, p. 634, 1928.

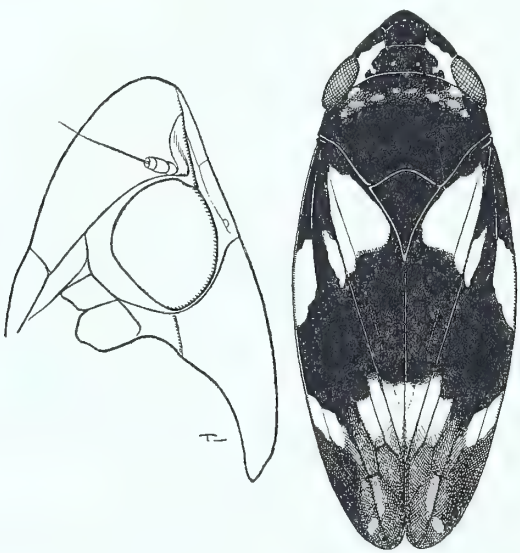
avait créé les genres *Aufidellus* et *Aufiterna* (*Rep. Exp. Stat. Haw. Sug. Plant. Assoc.*, Vol. 9, pp. 381 et 382, 1906). Elles ont été rapportées au genre *Aufidus* par Distant (*Rhynchota malayana*, Vol. ii, part ii, p. 132, 1908).

II. Les espèces recueilles dans les Iles Samoa.

APHROPHORINAE.

1. Clovia swezeyi, sp. n. Fig. 1.

2 ♀. Noire ou brun-noir ; sur les côtés du front, des stries transversales jaunâtres ; sur le vertex de chaque côté, une ligne partant de l'angle postérieur de la partie frontale, longeant l'oeil et s'étendant jusqu'au bord postérieur et derrière elle, sur le pronotum, une petite tache, jâune-brunâtre ; tiers basal du clavus, ainsi que sur le corium, une petite tache longitudinale près de la suture et sur le même plan au bord externe une autre en forme de trapèze (ces trois taches formant une bande transversale), enfin à la partie apicale, partant du bord externe, une tache allongée s'étendant jusqu' entre les branches du radius, jaune-clair ; extrémité du clavus et partie adjacente du corium d'un jaune légèrement brun ; la partie apicale des élytres est plus claire et plus ou moins transparente ; ailes enfumées, à nervures noires ; sur le pro- et mesosternum, partant de l'oeil, une bande jaune ; rostre, pattes, hanches, jaune-brunâtre ; tibias postérieurs plus foncés ; extrémité du rostre, des tarses et des épines, noire ; la couleur noire du vertex peut se muer en un brun plus ou moins foncé.



Texte-fig. 1.—*Clovia swezeyi*, sp. n.

Vertex en angle aigu, à extrémité arrondie, aussi long que large entre les yeux ; ocelles à peu près à égale distance l'un de l'autre et des yeux ; pronotum et écusson assez densément ponctués en stries transversales, sur le premier, une trace de carène longitudinale ; deux épines sur les tibias postérieurs. Cette espèce, comme les suivantes, a les nervures saillantes spécialement les apicales ; le réseau apical est composé de cinq cellules.

Longueur—10·5 mm.

Habitat—Ile Savaii, Safune, mai (Swezey) ; Ile Tutuila, Leone, juillet (Bryan).

Je dédie cette espèce à Mr. Swezey qui l'a récoltée dans l'île Savaii.

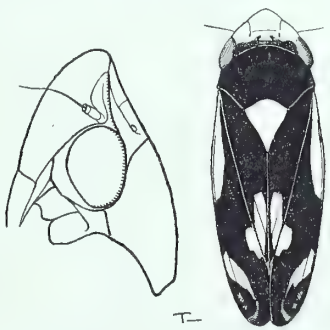
2. Clovia oceanica Jacobi.

Arch. f. Naturges. Jahrg. 87, Heft 12, p. 14, 1921.

Tonga (type) ; Samoa (Jacobi).

3. Clovia juddi, sp. n. Fig. 2.

3 ♂, 4 ♀. Noire ; vertex (sauf une bande postérieure), écusson, une bande longitudinale s'élargissant légèrement en arrière le long du bord externe et extrémité du clavus, jaunes ; sont d'un blanc-jaunâtre, transparentes, les taches suivantes : sur le corium, une près de l'extrémité du clavus, en face de celle-ci, partant du bord externe une deuxième de forme allongée, se dirigeant en arrière et en dedans, et se terminant en pointe, enfin près du bord apical deux autres plus petites (sur certains exemplaires ces dernières, ainsi que celles de l'extrémité du clavus peuvent disparaître) ; front jaune, ayant 6 à 7 stries transversales latérales et en dessous de celles-ci les côtés bruns. Espèce très voisine de *C. insignis* Dist., dont elle se différencie par le dessin du pronotum et des élytres, et de *C. oceanica* Jacobi, dont elle se distingue principalement par l'écusson jaune.



Texte-fig. 2.—*Clovia juddi*, sp. n.

Longueur—♂, 6·5 mm. ; ♀ 7 à 7·5 mm.

Habitat—Iles Manua ; Ofu et Tau, février et septembre (Judd, Swezey et Wilder).

Je dédie cette espèce à Mr. Judd, un de ceux qui en ont récolté des exemplaires.

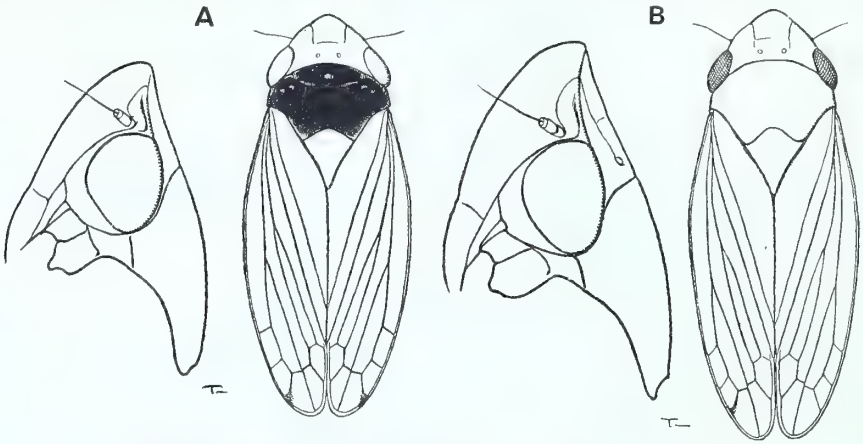
4. Clovia biformis, sp. n. Fig. 3.

♂. Tête, écusson, sternum, abdomen, jaunes ; élytres jaunes à la base, plus pâles ensuite et plus ou moins transparents, recouverts d'une villosité blanche, finement bordés de brun au bord apical, deux ou trois petites nervures, situées prés de celui-ci plus ou moins brunes ; sont noirs, le pronotum, 6 lignes

transversales interrompues à la partie médiane du front, l'extrémité du rostre, des tarses et des épines ; yeux bruns tachés de noir.

♀ diffère par le pronotum jaune, le bord apical et les nervures à peine bruns.

Vertex en angle obtus, sa longueur égale environ les trois quarts de sa largeur au bord postérieur ; ocelles légèrement plus près l'un de l'autre que des yeux ;

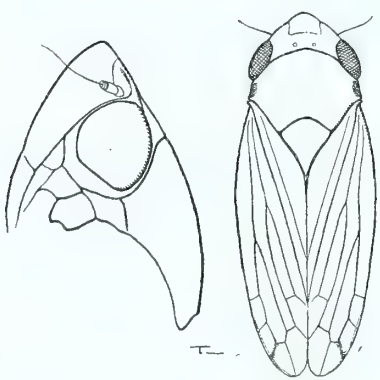


TEXTE-FIG 3.—*Clovia biformis*, sp. n. : A, male ; B, femelle.

pronotum ponctué en stries plus ou moins transversales ; derrière son bord antérieur, une série de fossettes formant une ligne parallèle à celui-ci ; deux épines sur les tibias postérieurs.

Longueur—9 mm.

Habitat—9 ♂ et 6 ♀, recueillis entre 100 et 400 m. d'altitude durant les mois de janvier, avril, juin, juillet, août et septembre, sur les herbes dans l'île Tutuila : à Pago Pago et dans le centre ; et l'île Upolu : à Malololelei.



TEXTE-FIG. 4.—*Clovia bryani*, sp. n.

5. Clovia bryani, sp. n. Fig. 4.

2 ♂. Orange ; yeux gris-brun fortement tachés de noir ; bords latéro-antérieurs du pronotum noirs ; petites nervures apicales plus ou moins brunes ; ailes enfumées à nervures noires ; face supérieure de l'abdomen et bords de sa face inférieure, extrémité du rostre, des tarses et des épines, brun-noir ; surface supérieure du corps recouverte d'une villosité argentée.

Front légèrement aplati, à stries latérales assez légères ; vertex à bord antérieur en angle obtus, arrondi, à surface déclive en avant, sa longeur égale à peu près les trois-quarts de sa largeur au bord postérieur ; deux épines sur les tibias postérieurs.

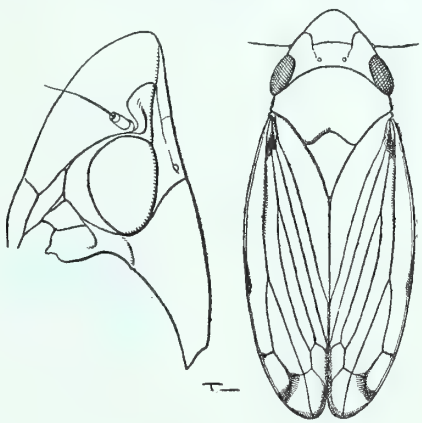
Longueur—7·5 mm.

Habitat—Ile Savaii : Salailua, mai (Bryan).

Je dédie cette espèce à celui qui l'a récoltée, Mr. E. H. Bryan.

6. Clovia armstrongi, sp. n. Fig. 5.

2 ♀. Jaune-orange, recouverte d'un duvet blanchâtre ; élytres oranges et opaques sur le clavus et le long de la moitié antérieure du bord externe entre celui-ci et le radius, blanc-jaunâtre et transparents sur le restant ; six stries latérales, transversales sur le front, une fine bande longitudinale sur le radius depuis la base jusqu'un peu au delà du tiers basal, bord externe, des nervures apicales, bord apical, bord interne très finement, extrémité des rostre, des épines et des tarses, brun-noir. Ces différentes taches à l'exception des lignes du front peuvent plus ou moins s'effacer. Abdomen brun-clair ; sur le prosternum, au niveau de la base des ailes, une tache brun-foncé.



TEXTE-FIG. 5.—*Clovia armstrongi*, sp. n.

Vertex long, en angle aigu, à extrémité arrondie ; sur le pronotum une série de petites fossettes allongées, formant une ligne paralléle au bord antérieur ; deux épines sur les tibias postérieurs ; front relativement assez aplati.

Longueur—8 mm.

Habitat—Ile Upolu : Apia ; Siumu ; recueillis en août et novembre.

Je dédie cette espèce à Dr. J. S. Armstrong, qui l'a capturé.

7. Clovia buxtoni, sp. n. Fig. 6.

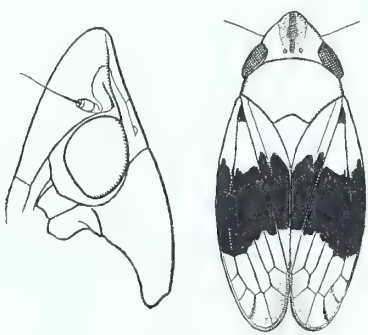
1 ♂. Blanc-jaunâtre, à tête légèrement plus jaune ; huit stries transversales, latérales du front, yeux et sur les élytres, une large bande transversale, médiane ainsi qu'un petit triangle près de la base entre la suture et le radius, noirs ; extrémité du rostre et des tarses, bande longitudinale médiane du vertex, nervures

apicales et bord apical jusque la pointe du clavus, abdomen, d'un brun plus ou moins foncé ; partie apicale des élytres transparente ; ailes hyalines, à nervures brunes. Partie médiane du front lisse, sur les côtés, des stries transversales ; rostre s'étendant entre les hanchès médianes ; yeux assez gros, saillants ; ocelles petits, légèrement plus près l'un de l'autre que des yeux ; vertex aplati, à peu près aussi long que large au bord postérieur entre les yeux ; pronotum ponctué en stries transversales, à faible sillon médian, longitudinal ; deux épines sur les tibias postérieurs.

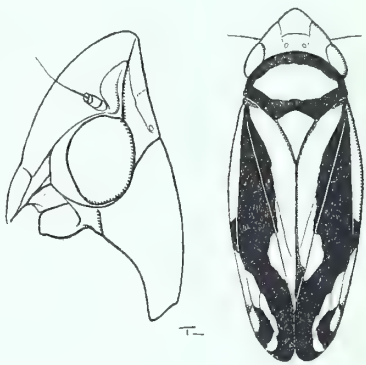
Longueur—6·5 ; élytres, longueur : 5 mm., largeur : 1·5 mm.

Habitat—Ile Upolu : Vailima, recueilli en décembre.

Je dédie cette espèce à celui qui la récoltée et a rassemblé la collection présente des homoptères des îles Samoa.



TEXTE-FIG. 6.—*Clovia buxtoni*, sp. n.



TEXTE-FIG. 7.—*Clovia navigans* Jacobi.

8. Clovia navigans Jacobi. Fig. 7.

Arch. f. Naturges. Jahrg. 87, Heft 12, p. 15, 1921.

Habitat—Ile Upolu : Apia ; Mulifanua ; Vailutai ; Falelatai ; Lalomanu. Ile Savaii : Tuasivi ; Salailua ; Fagamalo ; Safune. Ile Tutuila : Pago Pago ; Amauli.

Espèce répandue de préférence, semble-t-il, non loin des côtes.

9. Perinoia caput-ranae Le Guillon.

Rev. Zool., Vol. 4, p. 262, 1841 (*Aphrophora caput-ranae*).

Samoa ; Nouvelle-Guinée ; Nouvelle-Bretagne (Jacobi).

TOMASPIDINAE.

10. Aufidus hopkinsi, sp. n. Fig. 8.

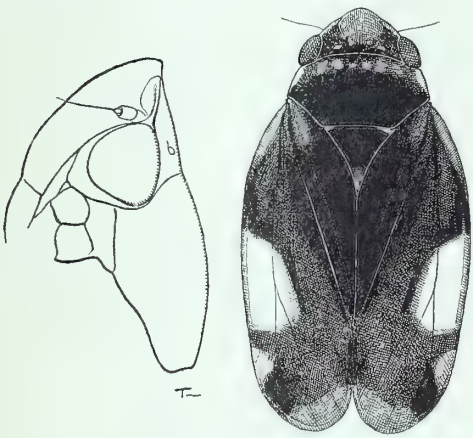
1 ♂. Partie supérieure du corps noir-brun, brillante, recouverte d'un duvet brun ; partie antérieure du vertex brune ; ailes brun-noir, plus foncées vers la partie apicale ; front, clypeus, rostre, pattes, jaunes ; extrémité des tarses et des épines, noire ; abdomen brun ; élytres, à base légèrement plus brune, à extrémité brun-clair, transparente, montrant en arrière du milieu une grande tache blanche, hyaline, s'étendant du bord externe au médian.

Ocelles très proches l'un de l'autre ; sur le pronotum, ponctué en stries transversales, une fine carène médiane ; deux épines sur les tibias postérieurs.

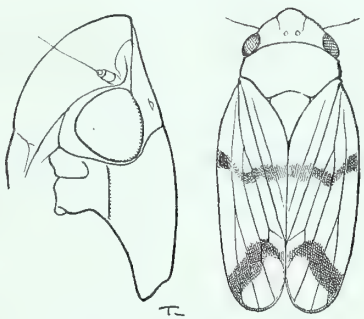
Longueur—8 mm.

Habitat—Ile Upolu : Malololelei ; recueilli en juin par P. A. Buxton et G. H. E. Hopkins.

Je dédie cette espèce à ce dernier.



TEXTE-FIG. 8.—*Aufidus hopkinsi*, sp. n.

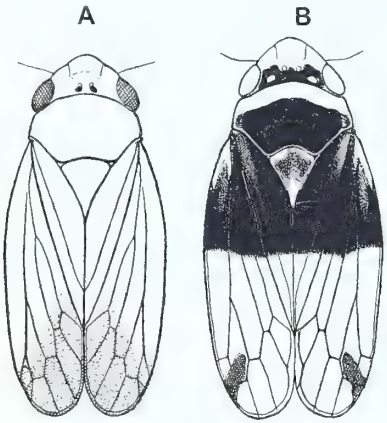


TEXTE-FIG. 9.—*Aufidus samoanus*, sp. n., forme typique.

11. Aufidus samoanus, sp. n. Figs. 9 et 10.

26 ♂ et 47 ♀. Orange ou quelquefois brun-orange ; abdomen plus foncé ; élytres plus clairs, transparents spécialement dans la partie apicale ; ocelles, yeux, extrémité des tarses, épines et sur les élytres une bande et une tache, noir-brun ; la bande des élytres transversale, située à peu près au milieu, part du bord externe et s'étend plus ou moins loin vers l'intérieur, elle peut même sur certains exemplaires atteindre le bord interne et alors est ondulée, sur d'autres elle est très courte ; la tache part de l'extrémité du bord externe et s'étend plus

ou moins loin dans la direction de la pointe du clavus ; sur certains spécimens bien marqués, la pointe du clavus est brune, la tache apicale peut s'allonger vers celle-ci et même l'atteindre ; de même, les bords postérieurs du vertex et du pronotum peuvent être bruns aussi ; partie supérieure du corps recouverte d'une villosité rousse. Sillon frontal large et relativement peu profond, commençant non loin du bord antérieur de la tête, celui-ci est en angle obtus ; ocelles très proches l'un de l'autre ; milieu de l'écusson creusé en fossette longitudinale ; une épine sur les tibias postérieurs.



TEXTE-FIG. 10.—*Aufidus samoanus* var. *immaculata* (A) ; var. *obscura* (B).

Var. *immaculata :* aucune tache à la face supérieure du corps.

Var. *obscura :* Vertex, pronotum, moitié basale et tache apicale des élytres brun-noir ; le bord postérieur de la partie brune n'est pas droit mais légèrement ondulé comme la bande sur la forme type ; la coloration orange primitive peut apparaître par places, à la partie antérieure du vertex et du pronotum, ainsi qu'à la base des élytres.

Longueur—6·5 à 7 mm.

Habitat—Ile Savaii : Tuasivi ; Salailua ; Safune. Ile Upolu : Malololelei ; Vaea ; Apia ; Vailima ; Mulifanua ; Falelatai ; Siumu ; Aleipata. Ile Tutuila : Amauli ; Afono ; Fagasa ; Leone ; Pago Pago, et le centre de l'île.

Var. *immaculata :* Ile Savaii : Safune. Ile Tutuila : Pago Pago.

Var. *obscura :* Ile Upolu : Siumu ; Malololelei ; Vaea. Ile Savaii : Safune.

Recueillis durant toute l'année, sauf pendant les mois de janvier et d'octobre.

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,, 2. *Clovia juddi*, sp. n.
,, 3. *Clovia biformis*, sp. n. : A, male, B, femelle.
,, 4. *Clovia bryani*, sp. n.
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,, 10. *Aufidus samoanus* var. *immaculata* (A) ; var. *obscura* (B).

CICADIDAE

By J. G. Myers, Sc.D.

(With 22 Text-figures.)

The cicadas seem to be represented in the Samoan Islands by one abundant and widespread species, and by two others which, judging from the collections examined, are very rare. *Baeturia exhausta* Guér. is essentially Austro-Malayan in distribution, and Samoa would appear to be its eastern limit, which it has reached by a route north of Fiji, in which group it does not occur. *Tibicen kuruduadua* Dist. occurs elsewhere only in Fiji, while the third species belongs to a remarkable new endemic genus—the first peculiarly Polynesian genus of cicadas.* This latter has Austro-Malayan affinities, but is strongly isolated. It is thus apparent that the evidence of the cicadas, so far as it goes, corroborates the general conclusion drawn by Muir from a study of the Fulgoroids, "that the Samoan Islands form an outpost of the Polynesian plateau."

I am deeply indebted to Mr. A. J. E. Terzi for the beautiful drawing of the venation which illustrates the new genus; and to Mr. W. E. China for many courtesies at the British Museum.

Subfamily PLATYPLEURINAE Handl.

Genus Tibicen Latr. 1825

Type *Cicada plebeia* Scop.

1. Tibicen kuruduadua Dist.

Cicada kuruduadua Distant, *Trans. Ent. Soc. London* (1881), p. 645, 1881; *Syn. Cat. Hom. Cicad.*, p. 39, 1906.

Upolu: Malololelei, 1 ♀, 30.viii.1925 (Armstrong).

In the absence of a male, this seems indistinguishable, save by paler colour, from *T. kuruduadua*, hitherto known only from Fiji. As a matter of fact this

* *Dasypsaltria* Haupt. is synonymous with *Platypleura*, and is not Samoan. See below.

female looks more truly congeneric with the type than do the females placed with the latter in the British Museum.

Structurally, except in the greater length of the tegmina, this species resembles *T.* (*Cicada*) *plebeia* Scop., with which it may be considered strictly congeneric. It certainly does not fall into any of the segregates—*Diceroprocta* Stål, *Chremistica* Stål, *Rihana* Distant—which it has been proposed to separate from the genus of which *C. plebeia* Scop. is the type. With regard to this genus I cannot accept Horváth's (*Ann. Hist. Nat. Mus. Hung.*, 23, pp. 93–98, 1926) new name *Lyristes*. The name *Tibicen* was first proposed in 1825, by Latreille (*Fam. nat. Règne Anim.*, p. 426) with *C. plebeia* as the only species mentioned. " Tibicen " is not a French word, as Horváth claims, nor is there any excuse for considering it, as Horváth does, a *nomen nudum*, since *C. plebeia*, given as its example, is still and was then, the best-known cicada in the world. I therefore follow Van Duzee in considering *C. plebeia* Scop. as the type of the genus *Tibicen* Latr. (= *Cicada* auctt. nec Linn.*). This course creates, in the subfamily nomenclature, a difficulty which Van Duzee (*Cat. Hemipt. North Amer.*, pp. 488, 498, 1917) has *not* met by calling the subfamily based on *Tibicen* Latr. Tibiceninae, and the other, founded on *Tibicina* Amyot, Tibicininae. Formed correctly from *Tibicen* and from *Tibicina* respectively, by adding *-inae* to the *stem*, the two subfamily names would be identical. I have therefore followed Handlirsch (*in* Schröder, *Handb. d. Entom.*, Bd. 3, pp. 1115–1117, 1925) in calling the former subfamily Platypleurinae, after another well-known, old and representative genus.

Moana,† g. n.

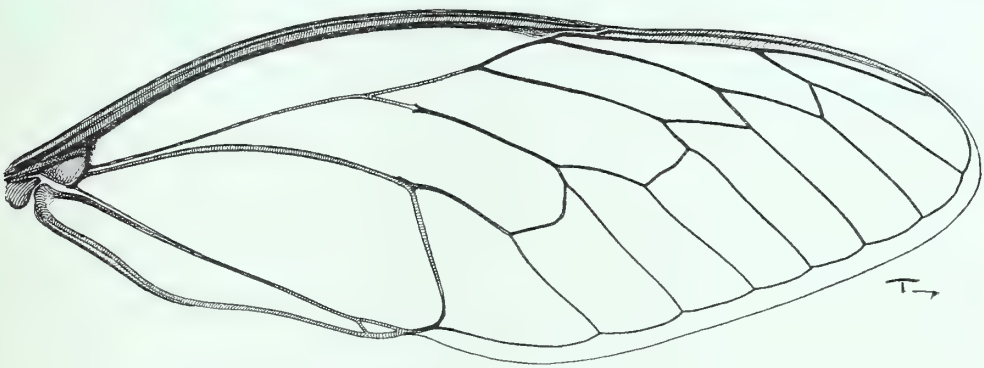
Head, including eyes, much narrower than base of mesonotum, head produced conically half its length in front of eyes. Frons elongate, considerably swollen basally, smooth and shining, the cross striae indistinct. Antennal scrobes prominent. Ocelli almost contiguous, the median ocellus directed straight forward. Pronotum apically the widest part of body, basally greatly constricted, so that the margins, which are slightly expanded at the apical angles, run very obliquely to the head. Sulci of vertex and pronotum deeply marked.

* Since *C. plebeia* Scop. was not among the originally included species of *Cicada* Linn. 1758, it obviously cannot be the genotype. The genotype now generally recognised is *C. orni* Linn.

† *Moana*—Samoan name for the ocean—thus appropriate for a cicadid genus, endemic in Oceania.

Mesonotum twice the length of pronotum; basal three-quarters domed and swollen; cruciform elevation relatively depressed, little developed, much constricted laterally. Abdomen small, conical, four-thirds length of mesonotum, than which it is almost wholly narrower, giving whole head and trunk a general fusiform shape. Tymbal covers complete, consisting of a somewhat narrow tongue reaching antero-laterally from each side of 2nd segment. Legs long and slender. Meracanthus long and slender, and hollowed ventrally.

Tegmina unusually expansive, much longer than body, with wings also, cross-ribbed at wide intervals, especially in the huge cell Cu_1. Stem of M extraordinarily thin and weak, leaving basal cell practically contiguous with



Text-fig. 1.—*Moana expansa* g. et sp. n., tegmen. A. J. E. Terzi del.

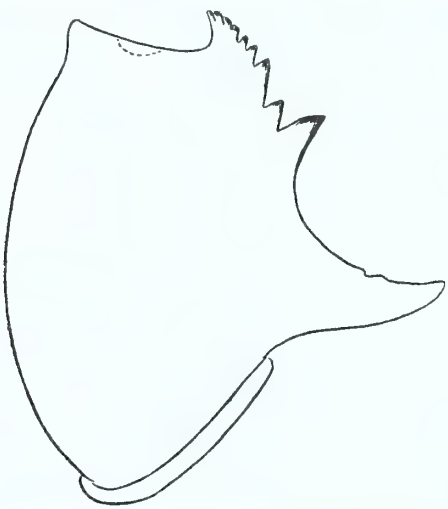
that of Cu_1. Cu_1 very stout, rib-like and compressed almost at right angles to the plane of the tegmen, strongly arched towards costal margin. A_2 very stout, practically contiguous with anal margin, which is itself much thickened, and bent outwards, so that clavus is wider than usual. Nodal line barely discernible on membrane. Hind wings normal, with six apical cells. Pygophor with no median dorsal spine, but two lateral projections directed caudad, as in *Sawda*, *Fatima*, *Cosmopsaltria* and related genera, but shorter. (Rest of the pygophor missing in the case of the type.) Curiously enough in the last nymph of same sex the pygophor bears a typical median dorsal spine.

The position of this genus, partly on account of the poor condition of the unique type, is obscure. The venation, however, shows it to be an extraordinarily aberrant form, which, with some hesitation, I place nearer to *Sawda* Dist. than to any other known genus. The tymbal covers closely resemble those of *Sawda*, though the opercula are much shorter than is usual in that genus. The narrow

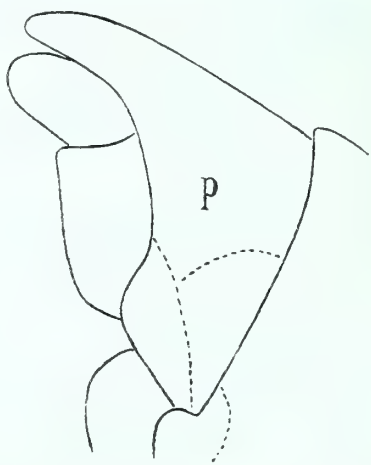
head is another common feature, as are also the close proximity of the ocelli and the sudden dip of the crown, so that the median ocellus looks directly forward. The meracanthus resembles closely that of *Sawda froggatti* Dist. It may be noticed that *Sawda* is an Austro-Malayan genus, with one species (known only from the female) also in Fiji. The present form could perhaps have been derived from a *Sawda*-like immigrant in Samoa.

2. Moana expansa, sp. n. Figs. 1–3, 22.

Male: dull olivaceous brown (type probably faded). Frons, sides of abdomen, and legs somewhat paler. A little scattered pale decumbent pubescence on thorax and abdomen, but no hairs. Ocelli edged with blackish. An indistinct paler median longitudinal stripe on pronotum. Mesonotum shining, with two narrow black longitudinal stripes on each side of disc, the



TEXT-FIG. 2.—*Moana expansa*, last nymphal instar, fore femur.



TEXT-FIG. 3.—*Moana expansa*, abdominal extremity of last nymphal instar of male.

inner pair impressed and about two-thirds length of outer pair, which nearly reach cruciform elevation. Tergites II–VII smudged with blackish centrally, and II–VIII laterally also. Tegmina hyaline, the veins brownish, darker distally.

Crown (including that part of frons visible dorsally) a little longer than basal width between eyes, and equal in length to disc of pronotum without

posterior depressed margin. Eyes very large. Posterior margin about one-fourth total length of pronotum. Opercula rounded apically, barely longer than meracanthus, widely visible in dorsal view. Fore femora weakly armed. Hind tibiae with five non-apical spines. (Hypandrium missing in type.) Lateral projections of pygophor short, blunt, emarginate dorso-apically. (Rostrum and most of legs missing in case of type.)

Length to tip of VIIIth tergite 25·3 mm., tegmen length, 43·3 mm., greatest width of tegmen (about halfway), 15·6 mm.

Male nymph, last instar: Eyes very large, antennae with 8 segments, of which I-IV have the usual few very large setae, while the rest are densely and evenly clothed with numerous small bristles. The tegmen pads show distinctly the strong and much curved Cu_1 and the weak M stem alongside it. Fossorial fore-legs with femora as figured. Pygophor ends in a typical median tergal spine, which is, however, delimited by a furrow shown dotted in the figure. Length 24·0 mm. (Length of head and thorax added to that of the abdomen, to avoid curve.)

Upolu: Lanutoo, 1 ♂, more or less fragmentary, taken from a spider's web; skilfully mended by Mr. China; no date (Hopkins); Malololelei, exuviae of one last instar ♂ nymph collected in rain forest at 2,000 feet, 26.iv.1924 (Bryan).

I have felt very chary of erecting a new genus on such poor material, but when one considers how many new Orders and lesser groups are founded on far less complete fossil insects, the objection ceases to have weight. The genus is well characterised, and the species should be recognisable from the above description.

The nymph, which is in perfect condition, is as aberrant as the imago. In most cicada nymphs known to me (e.g. *Platypleura*, *Henicopsaltria*, *Diceroprocta*, *Odopoea*, *Magicicada*, *Melampsalta*, *Baeturia*, *Tettigarcta*), the antennal segments, even to the apical one, are supplied with a relatively small number (2 or 3 up to about 6 per segment) of very large setae, sometimes as long as the segment itself, whereas in the present species these are replaced on segments V–VIII by numerous small bristles.

Subfamily TIBICININAE Dist.

Genus Baeturia Distant, 1892.

Type *Cicada conviva* Stål.

3. Baeturia exhausta Guér. Figs. 5–9, 11–17, 19–21.

Distant, *Syn. Cat. Hom. Cicad.*, p. 157, 1906.
Cicada exhausta Guér., *Voy. "Coquille," Zool.*, II, p. 181 (1838), pl. x, fig. 6 (1831).
C. hastipennis Walk., *List Hom. Brit. Mus., Suppl.*, p. 30, 1858.
Dundubia parabola Walk., *Ins. Saund. Hom.*, p. 6, 1858.

Savaii: Safune, up to 4,000 feet in rain forest, 4 ♂♂, 1 ♀, 2 exuviae, v. and xi. (Buxton, Hopkins, Bryan).

Upolu: Apia, Malololelei, Aleipata, Vaea, up to 2,000 feet, 14 ♂♂, 25 ♀♀, 3 exuviae, every month except i. and x. (various collectors).

Tutuila: Pago Pago, Fagatoga, Amauli, 8 ♂♂, 11 ♀♀, ii., iii., ix. (Steffany, Judd, Swezey, Wilder).

Manua: Ofu, Tau, 3 ♂♂, ii. (Judd).

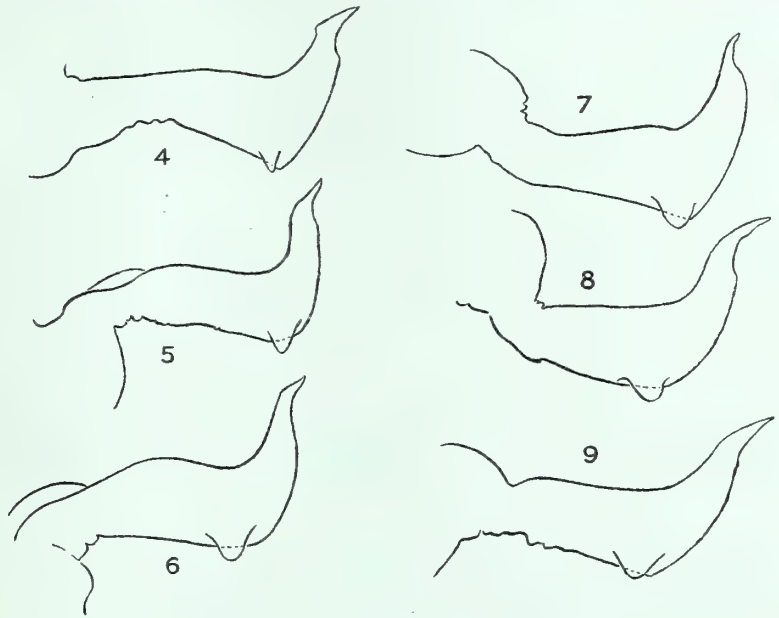
Samoa (island not specified): 2 ♂♂, 5 ♀♀, iii., iv. (Tate, O'Connor, and collector unknown—Brit. Mus.).

Total Samoan material: 31 ♂♂, 42 ♀♀, 5 exuviae (last instar).

There are two abundant and widespread Austro-Malayan species of *Baeturia*, which differ from the other species known to me in the blackish speckling of their pale ground colour. These two, *B. exhausta* Guér. and *B. conviva* Stål, have sometimes been considered only doubtfully distinct (Kirkaldy, *Haw. Sugar Planters' Exp. Sta. Entom. Bull.*, 12, p. 8, 1913). The characters on which they are usually separated are the greater average size of *B. exhausta*, and the extension of its tegminal cell R_5 (3rd apical cell) basad of cell R_2 (1st apical cell), whereas in *B. conviva* the bases of these two cells are opposite. On these two characters the Samoan material all agrees with *B. exhausta*.

Save for the Samoan extension of *B. exhausta*, the range of these two forms seems practically coincident. Judging from the above macroscopic criteria there are in the British Museum examples of both from Buru, Ceram, Amboina and New Guinea. There are specimens of *B. conviva* only from Doré, Timor, Mysol, Batchian and Duke of York I. (Bismarck Arch. ?); and of *B. exhausta* only from Gilolo, Torres Strait and Samoa. Size is at best an untrustworthy character, and in examples from several Austro-Malayan islands, notably Buru, the venational distinction between the two forms also breaks down. In the British Museum there are two males from the same locality in Buru, taken at the same

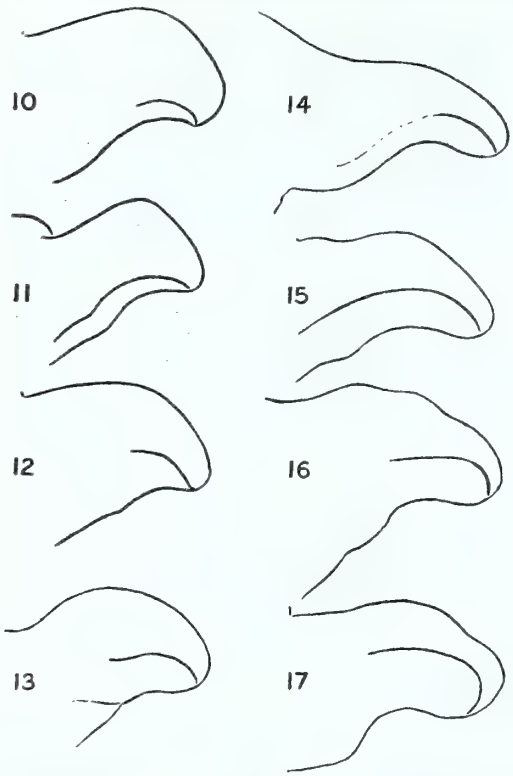
time, and almost identical in other respects, but with the base of cell R_5 basad of cell R_2 in the one, and distad in the other. The apical venation in Cicadidae is not very generally constant in details, although in the 73 Samoan examples this particular character holds. Unfortunately the type of neither species is available for study. The male external genitalia show certain variations, both in the aedeagus and in the copulatory claspers of the Xth segment, but at least in the two males from Buru already mentioned (figs. 6, 7, 12, 13) these are not



Text-figs. 4–9.—Fig. 4, *Baeturia conviva* Stål, Ceram, aedeagus, lateral view; fig. 5, *B. exhausta* Guér., type of *Dundubia parabola* Walk., aedeagus, lateral view; fig. 6, *B. exhausta* Guér., (example from W. Buru with venation of *B. conviva*), aedeagus, lateral view; fig. 7, *B. exhausta* Guér., (example from W. Buru with normal venation), aedeagus, lateral view; fig. 8, *B. exhausta* Guér., Samoan example, aedeagus, lateral view; fig. 9, *B. exhausta* Guér., (another specimen from Samoa), aedeagus, lateral view.

correlated with the venational differences. On characters presented by the genitalia these two males belong to *B. exhausta*. Figs. 4 and 10 show the corresponding parts in what we must provisionally regard as a typical *B. conviva*, to be contrasted with figs. 5 and 11, drawn from Walker's type of *Dundubia parabola*, which, with Distant, I consider as synonymous with *B. exhausta*. The other figs. (8, 9, 14–17) illustrate the variation among the Samoan material. If the specimen of *B. conviva* dissected by me is really typical, then this species may perhaps be regarded as distinct owing to the longer aedeagus and accom-

panying minor differences in this organ and in the shape of the claspers. On the basis of macroscopic and microscopic characters it is evident that we are dealing with one polymorphic form, comparable with *Metrosideros villosa* auctt. among the Pacific Myrtacae. To settle the question it will be necessary firstly, of course, to examine the respective types, and secondly to study series from the different islands comparable with the extensive one from Samoa that I have been privileged to examine. It seems to me very likely that material from more numerous intermediate stations would yield still more annectent examples than we have at present. In the meantime *B. conviva* is kept doubtfully distinct, and the Samoan forms are regarded as belonging to *B. exhausta.* To show more fundamental variation in genitalia in the genus, the aedeagus of an undoubtedly distinct species, *B. famulus* Dist., is represented in fig. 18.



TEXT-FIGS. 10–17.—Fig. 10, *B. conviva* Stål, Ceram, left clasper (Xth segment); fig. 11, *B. exhausta* Guér., type of *D. parabola* Walk., left clasper (Xth segment); fig. 12, *B. exhausta* Guér., (example from W. Buru with venation of *B. conviva*), left clasper (Xth segment); fig. 13, *B. exhausta* Guér., (example from W. Buru with normal venation), left clasper (Xth segment); fig. 14, *B. exhausta* Guér., from Samoa, left clasper (Xth segment); fig. 15, *B. exhausta* Guér., (another specimen from Samoa, Apia), left clasper (Xth segment); fig. 16, *B. exhausta* Guér., (still another specimen from Samoa, Apia), left clasper (Xth segment); fig. 17, *B. exhausta* Guér., Samoan example (Savaii), left clasper (Xth segment).

The type of *Cicada hastipennis* Walk. is a female which agrees specifically with *D. parabola,* and thus presumably with *B. exhausta.**

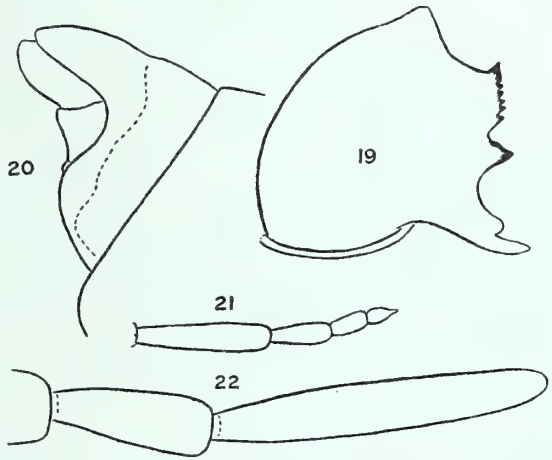
The nymph of *Baeturia exhausta.* —As pointed out on other occasions, the last nymphal exuviae of cicadas make beautiful objects of study. In the present species the antennae have 9 segments, including a very minute

* In view of the above discussion, the *Baeturia* species of Buru are of the greatest interest. Schmidt (*Treubia,* 7, p. 222, 1926) records from the island in question *B. conviva, B. exhausta,*

apical one. These segments are supplied, as usual, with a few setae, up to half a dozen on a segment, and sometimes as long as the segment itself. Between these large setae the surface is bare of ordinary hairs. The fore femur and the extremity of the abdomen in the last instar male nymph are shown in figs. 19, 20. Length (length of head and thorax added to that of abdomen) 18·8 mm.



TEXT-FIG. 18.—*B. famulus* Dist., aedeagus, lateral view.



TEXT-FIG. 19–22.—Fig. 19, *B. exhausta* Guér., last nymphal instar, fore femur; fig. 20, *B. exhausta* Guér., abdominal extremity of last nymphal instar of male; fig. 21, *B. exhausta* Guér., apical antennal segments of last nymphal instar of male; fig. 22, *Moana expansa*, apical antennal segments of last nymphal instar of male.

One male specimen of *B. exhausta* from Apia (Buxton and Hopkins) has a mass of hardened adhesive matter clogging its face and mouth-parts. It bears the highly interesting explanatory label, "The value of latex to plants! This cicada tried to suck *Carica papaya*."

B. bicolorata Dist. and *B. schulzi*, sp. nov., but, from his notes based on badly-preserved material I doubt whether the third species is correctly recorded. His *B. schulzi* is said to be related to *B. viridicata* Dist., of New Guinea, but judging from the description it is evidently much more typical. The type of *B. viridicata* has almost opaque tegmina with the ambient vein almost coincident with the margin, and greatly reduced opercula, which reach only half-way along the meracanthus. In these three respects *B. schulzi* would seem more like *B. exhausta* and *B. conviva*. Schmidt's new genus, *Toxopeusella* (*l.c.*, p. 224) is apparently well-founded, although the geno-type, *Cicada stigma* Walk., is represented in the British Museum only by the original female. The common stem from the basal cell of the tegmen is not, however, M plus Cu as stated by Schmidt, but M plus Cu_1 only. The statement that fore and hind wings are in *T. stigma* "quergerippt" and in *Baeturia* not, is incorrect, as an examination of *B. exhausta* and *B. conviva* will show, though this character is certainly more marked in *T. stigma*.

A female example (Apia, ii.1924, Buxton and Hopkins) has a large piece bitten out of the base of the abdomen, and was taken from a large introduced wasp, *Polistes macaënsis* which had captured it. Vespids are also known as enemies of cicadas in North America (Davis).

" *Dasypsaltria maera* " Haupt = *Platypleura divisa* (Germ.).

In 1917 Haupt (*Stett. Ent. Zeit.*, Bd. 18, p. 303, fig. 1) erected under the name *Dasypsaltria*, a new monotypic genus to receive *D. maera*, a supposed new species believed to have been collected in Samoa. On 7th June, 1926, Herr Haupt was so good as to write to me regarding this species as follows :—

" In meiner *Dasypsaltria maera* möchte ich bemerken, dass ich da getäuscht worden bin. Sie gehört zu der stark variierenden *Platypl. divisa* Germ., was ich aber wegen des etwas abnormen Pronotums leider zu spät erkannte. Getäuscht wurde ich auch durch die Herkunfts-Angabe. Einer unserer Kolonial Beamten hatte das Tier in Süd-Afrika erbeutet, reiste von dort nach Samoa und sandte es von dort zur Bestimmung nach Halle." *Dasypsaltria* is thus a synonym of *Platypleura*.

In the meantime, unfortunately, Kato (*Trans. Nat. Hist. Soc. Formosa*, 17, p. 210, 1927) has described a new Formosan cicada as *Dasypsaltria formosana*.

LIST OF TEXT-FIGURES.

(Corresponding parts shown at similar magnification ; hairs and setae omitted.)

Text-fig. 1. *Moana expansa* g. et sp. n., tegmen, A. J. E. Terzi del.
,, 2. *Moana expansa*, last nymphal instar, fore femur.
,, 3. *Moana expansa*, abdominal extremity of last nymphal instar of male.
,, 4. *Baeturia conviva* Stål, Ceram, aedeagus, lateral view.
,, 5. *B. exhausta* Guér., type of *Dundubia parabola*, Walk., aedeagus, lateral view.
,, 6. *B. exhausta* Guér., Bara, W. Buru (example with venation of *B. conviva*), aedeagus, lateral view.
,, 7. *B. exhausta* Guér., Bara, W. Buru (example with normal venation), aedeagus, lateral view.
,, 8. *B. exhausta* Guér., Apia, Samoa, aedeagus, lateral view.
,, 9. *B. exhausta*, Guér., Apia, Samoa (another specimen), aedeagus, lateral view.
,, 10. *B. conviva* Stål, Ceram, left clasper (Xth segment).
,, 11. *B. exhausta* Guér., type of *D. parabola*, Walk., left clasper (Xth segment).
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,, 14. *B. exhausta* Guér., Apia, Samoa, left clasper (Xth segment).
,, 15. *B. exhausta* Guér., Apia, Samoa (another specimen), left clasper (Xth segment).
,, 16. *B. exhausta* Guér., Apia, Samoa (still another specimen), left clasper (Xth segment).
,, 17. *B. exhausta* Guér., Savaii, Samoa, left clasper (Xth segment).
,, 18. *B. famulus*, Dist., aedeagus, lateral view.
,, 19. *B. exhausta* Guér., last nymphal instar, fore femur.
,, 20. *B. exhausta* Guér., abdominal extremity of last nymphal instar of male.
,, 21. *B. exhausta* Guér., apical antennal segments of last nymphal instar of male.
,, 22. *Moana expansa*, apical antennal segments of last nymphal instar of male.

AQUATIC AND SEMIAQUATIC HETEROPTERA.

By Teiso Esaki.

(With 6 Text-figures.)

Although a few representatives of this group of insects have been described from material collected in Fiji, the Marquesas Is., New Caledonia and the Society Is., none have yet been recorded from Samoa.

In the present paper ten species, representing four families, are mentioned or described. All belong to genera typical of the South Pacific region, but they include five new species, some of which may prove to be endemic.

Unless otherwise stated, all the specimens were collected by Messrs. P. A. Buxton and G. H. Hopkins.

VELIIDAE.

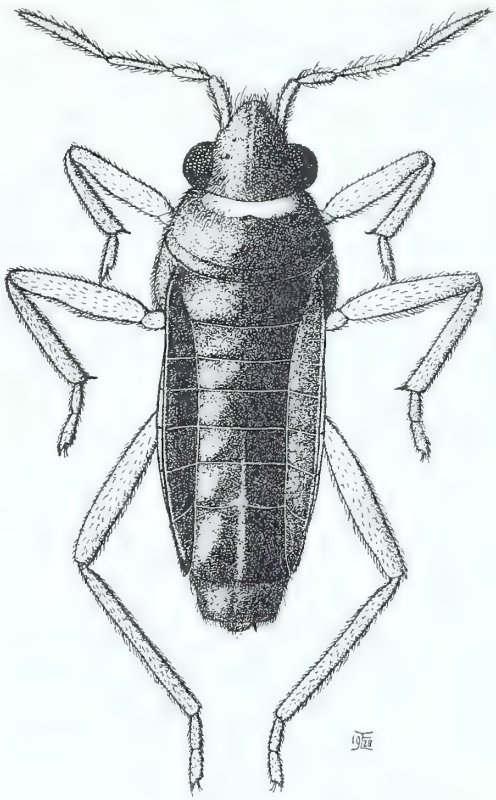
Microvelia Stål.

Besides those occurring in Australia, three species of this genus, *Microvelia oceanica* Distant (New Caledonia), *M. pacifica* Kirkaldy (Fiji), and *M. prompta* Cheesman (Tahiti), are known to exist in the South Pacific Islands. Another new species is now added to the fauna.

1. Microvelia samoana, sp. n. Text-fig. 1.

♂ ♀. Black, covered with grayish pubescence. Head black, lateral portions of vertex along the eyes brown, pubescence whitish along the median longitudinal line. Eyes black, shining. Antennae dark brown, apical segment darker. Rostrum dark brown, with the extreme apex black. Pronotum black, with a conspicuous brown band along the anterior margin where the pubescence is pale brown. Dorsal and ventral surfaces of meso- and metathorax, and of abdomen totally black, connexivum sometimes slightly brownish. Legs brown, with the apical one-third to two-fifths of femora, tibiae and tarsi much darker than the rest of femora, trochanters and coxae.

Size, small. Body elongate, lateral margins roughly parallel, covered with coarse pubescence and punctures. Vertex conically produced anteriorly, rounded at the apex. Three or four pairs of sensory pits along the lateral submarginal areas; the apex with long setae. Eyes much rounded laterally, agglomerate. Antennae slender, first segment stout, slightly curved outwardly, slightly thickened at the middle; second, three-fourths the length of first, thinner than the latter, a little thickened towards the apex; third very slender, nearly as long as first; fourth much the longest, twice as long as second, one and a half times as long as first, thickened in the middle. Ratio of the antennal segments—12 : 9 : 11 : 18. Rostrum reaching the anterior coxae, second segment (in reality this may be the third) much the longest. Pronotum transverse, both anterior and posterior margins shallowly sinuate posteriorly, lateral margins slightly rounded, convergent anteriorly; a more or less distinct submarginal depression along the posterior margin; meso- and metanotum together about half as long as pronotum. Legs moderately slender, covered with setose hairs, femora moderately thickened in the middle; anterior tibia about three-fourths of femur, tarsus long, a little longer than half the length of tibia; intermediate femur and tibia nearly equal in length, tarsus about half as long as tibia, two segments of equal length; posterior tibia longer than femur, slender, tarsus short, two segments of equal length. First four dorsal abdominal segments subequal in length, fifth a little longer than fourth, sixth nearly as long as fourth and fifth taken together. Connexivum obliquely erect in male, turning over the dorsal surface of abdomen in female, in which the dorsal surface of the last four segments is scarcely visible.



TEXT-FIG. 1.—*Microvelia samoana* Esaki, sp. n., ♂.

Length of body: ♂ 1·6 mm., ♀ 1·7 mm.; breadth of body: ♂ 0·6 mm., ♀ 0·7 mm.

Upolu: Mulifanua, type ♂, type ♀, 2 ♂ paratypes, x.1925, in marsh.

This species is smaller than *Microvelia prompta* Cheesman and larger than *M. oceanica* Distant.* From the former *M. samoana* Esaki differs also in the stouter shape of the body and the much narrower connexivum. From the latter it differs in the ratio of the antennal segments.

GERRIDAE.

Limnogonus Stål.

Three closely allied species of this genus occur in the Pacific Islands. These are:

Limnogonus fossarum (Fabricius), type locality, E. India.

Limnogonus discolor (Stål), type locality, Tahiti.

Limnogonus luctuosus (Montrouzier), type locality, New Caledonia.

Limnogonus nymphae (Esaki), of Formosa, can be synonymised with *L. fossarum* (Fabricius), and *L. lineatus* (Carpenter), of Murray Island, may be synonymous with *L. discolor* (Stål). The type (♂) of *L. lineatus* (Carpenter) is in the British Museum; with that exception I have not yet had the oppor-

* Hale (*Records S. Austr. Mus.*, Adelaide, iii, p. 208, 1926) identified an Australian *Microvelia* as *M. oceanica*, but his species is quite distinct from *M. oceanica* Distant, and is apparently new. It may be characterised as follows:

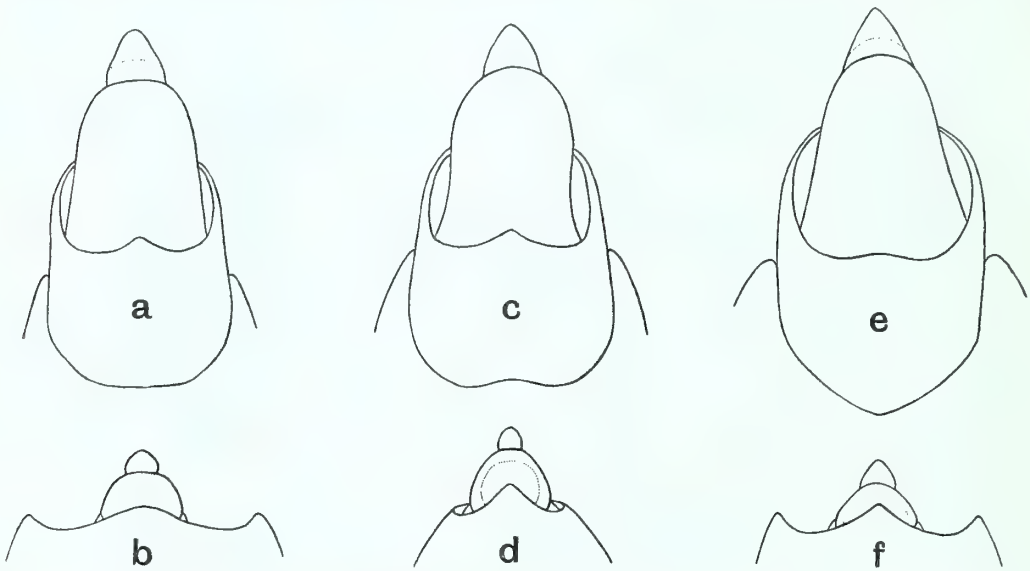
Microvelia halei, sp. n.

♂♀. Differing from *Microvelia oceanica* Distant in the following characters:

Larger size: Length of body in apterous form "1·66 mm. to 2 mm.," while in the apterous form of *M. oceanica*, the body measures 1·51 mm. in the ♂, and 1·65 mm. in the ♀. These measurements were made from the cotypes of *M. oceanica* Distant in the British Museum. Distant's original description (Sarasin and Roux, *Nova Caledonia, Zool.*, i, pt. 4, no. 10, p. 383, 1914) was based only on the winged form, which measures "2 mm.," though the author gave figures of both forms.

Different ratio of the antennal segments: Hale describes the antennae of *M. oceanica* Hale, *nec* Distant, as follows: "first segment nearly one-fourth longer than second, subequal in length to third and about three-fifths as long as fourth, which is more than twice as long as the second." In the true *M. oceanica* the ratio is 10 : 8 : 10 : 21 and 11 : 9 : 11 : 23 in ♂ and ♀ respectively. Thus in the latter species the last segment is considerably longer, in comparison with the other segments, than in *M. halei*, in which it is much less than twice the length of the third segment. Reference should be made to the full description and figures given by Hale (*loc. cit.*).

tunity of studying the types of these species. It is therefore impossible to identify the species correctly, since the original descriptions are all insufficient to distinguish one from another. For the time being, therefore, I have identified them with three distinct species occurring respectively in the type localities. A common Indian species, which is also widely distributed over the Malay Archipelago, the Philippine Is. and Formosa, has been selected as probably identical with *L. fossarum* (Fabricius); the only Tahitian species of which there are examples in the British Museum has been regarded as representing *L. discolor* (Stål); and a New Caledonian species has been identified as *L.*



Text-fig. 2.—Ventral view of the genital segments of *Limnogonus*-species, semi-diagrammatic. *a*, *Limnogonus luctuosus* (Montrouzier), ♂; *b*, ♀. *c Limnogonus pacificus* Esaki, sp. n., ♂; *d*, ♀. *e*, *Limnogonus fossarum* (Fabricius), ♂; *f*, ♀.

luctuosus (Montrouzier). When the types of the species in question are examined it is possible that some alterations will have to be made. Of these three species, one occurs in Samoa.

2. Limnogonus luctuosus (Montrouzier). Text-fig. 2, *a*, *b*.

Gerris luctuosa Montrouzier, *Ann. Soc. Linn. Lyon*, xi, p. 242, 1864; Distant, Sarasin and Roux, *Nova Caledonia, Zool.*, i, pt. 4, no. 10, p. 384, 1914.

Upolu: Laulii, 1 ♀, 21.i.1925.

This species was hitherto only known to occur in New Caledonia.

3. Limnogonus pacificus, sp. n. Text-fig. 2, *c*, *d*.

♂♀. Very closely allied to *Limnogonus fossarum* (Fabricius) and its allies, differing only in the structure of the genital segments of both sexes, except that the female is proportionally much stouter in shape than the male.

The differences in the genital segments of the two species (better shown in text-fig. 2, *c*, *d*, *e*, *f*) are indicated in the subjoined tabular statement.

L. pacificus, sp. n.	*L. fossarum* Fabricius.
♂. Posterior ventral margin of sixth abdominal segment sinuate on each side of middle line (see text-fig. 2, *c*).	♂. Posterior ventral margin of sixth abdominal segment deeply excavated in middle line, thus forming a parabola (text-fig. 2, *e*). [The figure is made from a specimen from Bor Ghat, India. The shape of this sinuation seems variable to some extent, but it is never as in *L. pacificus*.]
Posterior ventral margin of first genital segment distinctly pointed in the middle.	Posterior ventral margin of first genital segment slightly sinuate, not at all pointed in the middle. Second ventral genital segment broader, lateral margins convergent posteriorly.
♀. Abdomen and connexiva much broader; sternite of last abdominal segment much more reflexed dorsally.	♀. Last abdominal segment less reflexed dorsally, forming three equal teeth seen from venter.

All the specimens of *L. pacificus* in the collection are apterous. Pronotum protruded posteriorly, covering a part of mesonotum, as in the apterous form of the allied species. Second and third abdominal tergites in female with bluish-gray pubescence. Antennae similar to those of *L. fossarum*, the first segment much the longest, the remaining three segments subequal in length: the exact ratio shows a slight variation to some extent.

Length of body: ♂ 8·0–8·5 mm., ♀ 8·5–9 mm.; breadth of body: ♂ 2 mm., ♀ 3 mm.

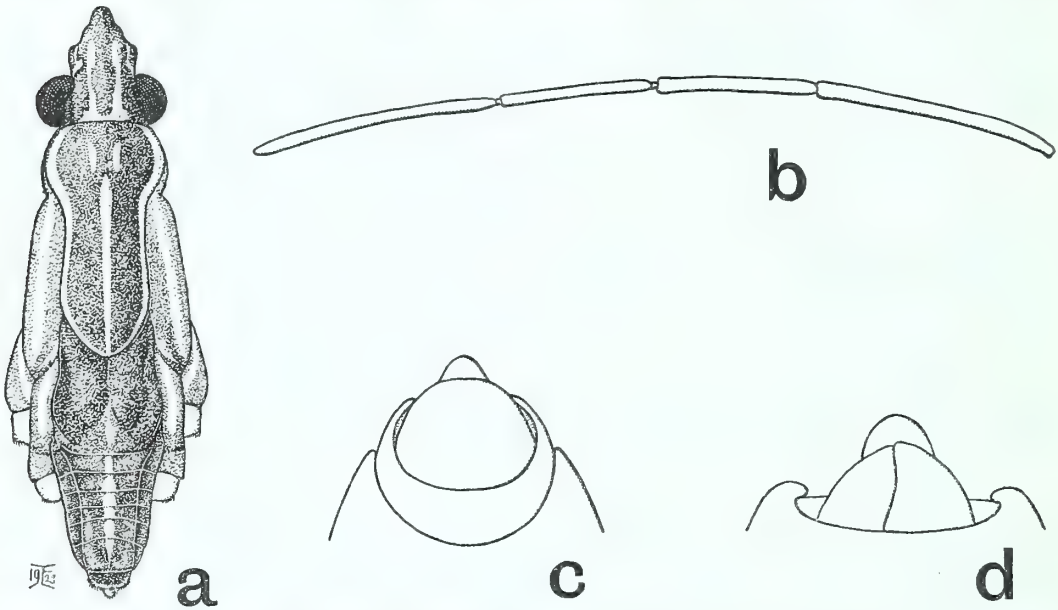
Upolu: Malololelei, 2,000 feet, type ♂, i., v.1924; Apia, 2 ♀♀ (including type ♀), 9.iv.1924, 1 ♂ paratype, 25.iv.1924; Mulifanua, 1 ♀, 17.vii.1925.

4. Limnogonus buxtoni, sp. n. Text-fig. 3.

The apterous form is the only one represented in the collection. Males much smaller than females.

♂. Fusiform. General markings similar to those of the other species of the genus, but the insect is more or less thickly covered with minute golden

pubescence, partially shining on pronotum and dorsal surface of abdomen. Head black above, with a pale yellowish brown U-shaped marking and a small spot just in front of each eye, which is confluent with the pale yellowish brown under side of head. Eyes dark brown, shining. Antennae dark brown. Rostrum pale yellowish brown, except extreme apex, which is black. Pronotum black, lateral and postero-lateral margins, two spots on the anterior area, and a stripe along the median longitudinal line except the anterior part pale yellowish



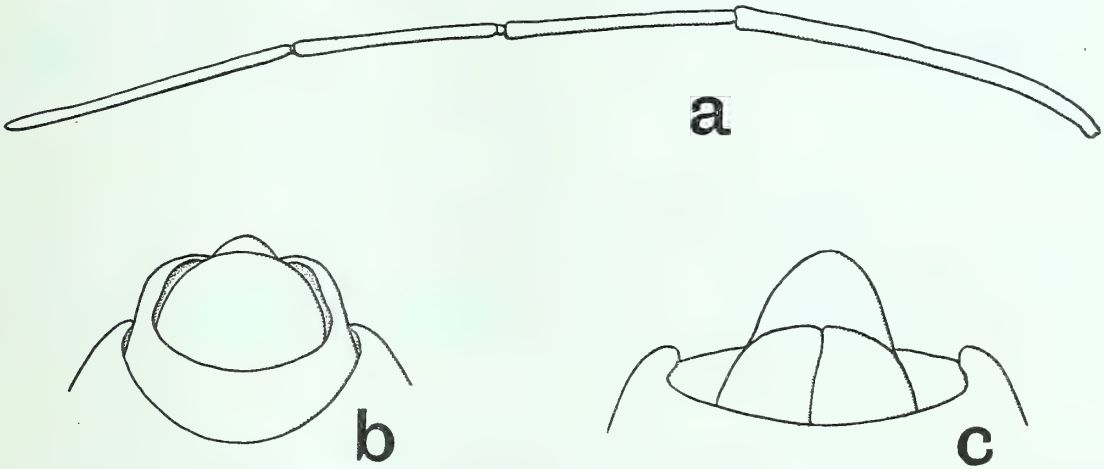
TEXT-FIG. 3.—*Limnogonus buxtoni* Esaki, sp. n. *a*, ♂, dorsal view; *b*, antenna; *c*, ♂, genital segments, ventral view, shown upside down; *d*, the same of ♀.

brown. Dorsal surface of meso- and metanotum, and of abdomen black, with a more or less distinct stripe along the median line, pale yellowish brown; in ♀ lateral portions of last three or four dorsal segments faintly brown. Legs dark brown, anterior femur paler. Sides and under side of body pale yellowish brown, with the lateral area of prothorax, a small spot on pro-acetabulum, lateral stripes on mesothorax, a very small spot at the end of meso-acetabular suture, and a large spot on meso- and meta-acetabulum, black. Sides of abdomen dark brown, or a dark brown spot on each segment.

Eyes much rounded exteriorly, distinctly but not much emarginate interiorly. Three pairs of very long sensory setae along the submarginal line on vertex (easily visible in profile). Antennae very long and slender, first segment the

stoutest and slightly curved near base ; second and third segments equal in length ; fourth a little longer than first or subequal to it. Hind margin of last (sixth) abdominal sternite roundly sinuate, forming an arc, genital segments much rounded at the apex (see text-fig. 3).

♀. Similar to male, but much larger. Fourth segment of antennae sometimes slightly shorter than, generally subequal to first segment in length. Last (sixth) abdominal sternite truncate at apex, without tooth-like process.



Text-fig. 4.—*Limnogonus hopkinsi* Esaki, sp. n. *a*, antenna : *b*, ♂ genital segments, ventral view ; *c*, the same of ♀.

Length of body : ♂ 4 mm., ♀ 6 mm. ; breadth of body : ♂ 1·3 mm., ♀ 2 mm.

Upolu : Apia, type ♂, type ♀, 3 ♂ paratypes and 1 ♀ paratype, 5.vi.1924 ; Vailima, 1 ♂, 1 ♀, 20.iii.1925.

This interesting species is unlike any other known member of the genus *Limnogonus* owing to the striking difference in size between the sexes, the shape of the last abdominal and genital segments, and the considerable length of the last antennal segment, which is the longest of all in the male. With the exception of some oceanic forms, the sexual difference in size is not so striking in other members of the *Gerris*-group. *Limnogonus hopkinsi*, sp. n., described below—a much larger species—exhibits a similar sexual dimorphism in the matter of size.

5. Limnogonus hopkinsi, sp. n. Text-fig. 4.

♂♀. Apparently very similar to the foregoing species, except in size. The description of the colour and markings of *L. buxtoni* Esaki will serve also for the present species. The ♂ of this species is about as large as the ♀ of *L. buxtoni*,

while the ♀ of the former is considerably larger than the male. Among the material collected, there is a slight variation in size and coloration. The specimens taken in Savaii are much darker than those obtained in Upolu. In the latter material the brown margins of the pronotum are sometimes much more widened at the apex.

First segment of antennae much the longest, second and fourth subequal, or the former a little shorter than the latter ; third, the shortest ; fourth, unlike that in *L. buxtoni*, always much shorter than the first.

Genital segments of both sexes very similar to those of *L. buxtoni* as shown in the figures.

Length of body : ♂ 5–6 mm., ♀ 9–10 mm. ; breadth of body : ♂ 2 mm., ♀ 3 mm.

Upolu : Malololelei, 2,000 feet, type ♂, type ♀, 3 ♂ and 2 ♀ paratypes, 4.v.1924 ; 1 ♂, 1.v.1924 ; 6 ♂♂, 6 ♀♀, 14–30.vi.1924. Savaii : Safune, rain forest, 2,000–4,000 feet, 4 ♂♂, 3 ♀♀, 5.viii.1924 (Bryan).

It appears probable that this species is confined to the mountain streams ; *L. buxtoni* occurs at lower levels.

6. Halobates princeps B. White.

Halobates princeps B. White, *Rept. Voy.* " *Challenger*," *Zool.*, vii, pt. 19, pp. 39, 44, pl. i, fig. 3, 1883.
Halobates alluaudi Bergroth, *Rev. d'Ent.*, xii, p. 204, 1893 ; Kirkaldy, *Ann. Soc. Ent. France*, lxviii, p. 103, 1899 ; Esaki, *Ann. Mus. Nat. Hung.*, xxiii, p. 133, 1926 (*Syn. nov.*).
Halobates sericeus Matsumura (*nec* Eschscholtz), *Thous. Ins. Japan*, Addit., i, p. 97, pl. xi, fig. 8, 1913.
Halobates matsumurai Esaki, *Psyche*, xxxi, p. 117, pl. v, fig. D, 1924 (*Syn. nov.*).

Upolu : Apia, 1 ♂, 1 ♀, 2.iii.1924, on surface of sea.

Bergroth, who described *Halobates alluaudi* from material from the Seychelles, wrote (*loc. cit.*, p. 205) : " *H. principi* B. White affinis, sed tarsis omnibus, praesertim posticis, multo brevioribus et trochanteribus mediis inermibus bene distinctus." Recently I have examined the type of *H. princeps* B. White (a single female, in the British Museum), and have found an important particular in which B. White's statement and figure are incorrect. He writes (*loc. cit.*, p. 45) : " [the hind] tarsus about five-eighths of the length of tibia," but, in reality, the measurements afforded by the unique type are :—hind tibia : tarsus = 43 : 13, *i.e.* roughly 3 : 1. This agrees quite well with the statement of Bergroth (*loc. cit.*, p. 205), in the description of *H. alluaudi* : " [tibia postica] tarso saltem triplo longiore," which is the only difference between *H. princeps*

and *H. alluaudi*, except the armature of the middle trochanters. B. White (*loc. cit.*, p. 45), writes: "[the middle] trochanter armed with spines," but these "spines" are not real spines, but stout setae, which are sometimes torn off even during the life of the insect. I have also examined the type material of *H. alluaudi* Bergroth in the Muséum National d'Histoire Naturelle, Paris, and am now quite sure that this supposed species is identical with *H. princeps* B. White. *Halobates matsumurai* Esaki is also synonymous with this species.

H. princeps is now known to be widely distributed over the Indian and Pacific Oceans, as far as the Seychelles in the west, and the Pacific coast of Southern Japan in the north.

GELASTOCORIDAE.

7. Peltopterus macrothorax (Montrouzier).

Galgulus macrothorax Montrouzier, *Ann. Sc. Phys. Nat.*, Lyon, (2), vii, pt. 1, p. 110, 1855.
Scylaecus macrothorax Stål, *Öfv. Vet.-Akad. Förh.*, xviii, p. 201, 1861; Enum. Hemip, v (*Svensk. Vet.-Akad. Handl.*, xi, no. 4), p. 139, 1876.
Peltopterus macrothorax Stål, Berlin, *Ent. Zeit.*, vii, p. 408, 1863; *Öfv. Vet.-Akad. Förh.*, xxvii, p. 706, 1870; Montandon, *Bul. Soc. Sci. Bucuresci*, viii, p. 779, 1899.

Tutuila: Leone Road, a single ♂, 8·5 mm. in length, 9.ix.1926 (Judd).

This species was previously known to occur in Woodlark I., Fiji, the Philippine Is., N. Borneo, Aru, the Solomon Is., and Marianne or Ladrone Is. In the British Museum collection there are, in addition to those from Woodlark I., Fiji, the Marianne and Philippine Is., specimens from Ke Dulan (in the Ké [= Kei] Islands, 1 ♂, 1 ♀, 25.ix.1874, "Challenger" collection), Formosa (1 ♂, without further data), and "Madgico-sima, Corea" * (3 ♀♀).

* These specimens from "Corea" were collected by Arthur Adams during the voyage of H.M.S. *Samarang* under Captain Sir E. Belcher, C.B., R.N., and deposited in the British Museum in 1845 with many other specimens. The three specimens are labelled "Corea," and only one of them has a second label, "Dry sand, Madgico-sima." There is no doubt that these three were collected at the same time. I believe that "Madgico-sima" is not an island near Corea, because at the time of this voyage no Japanese name was officially used for the Corean geographical places ("*sima*" or *shima* means "island" in Japanese). On the other hand, the Yayeyama Islands in the Loo Choo Group, lying between Okinawa and Formosa, have sometimes been called as "Majico-sima" or "Mayico-sima." It may be fairly safe to assume that this "Madgico-sima" is identical with "Mayico-sima." If my assumption is correct, it is very interesting to find this typical oceanic species on these islands (the chief islands are Ishigaki-jima and Iriomote-jima), which are, together with Kôtôsho (= Botol Tobago), zoogeographically much more closely related to the Philippine Islands than to Formosa, in spite of their closer proximity to the latter than to the

NOTONECTIDAE.

Anisops Spinola.

This large genus, which is represented by three species in the collection, has now become taxonomically one of the most difficult groups of water-bugs. As Bergroth * remarked, "Kirkaldy has published revisions of the different genera † of this family, but his attempt to make them better known was a failure. These insects offer good specific characters, but Kirkaldy was unable to express the differences in words, and his descriptions are so vague and confusing, and in so many cases positively wrong (especially in the comparative measurements of the tibiae and tarsal joints) that they are practically almost useless."

The species mentioned below have been carefully determined by the study of many types and of more recent literature of the group.

8. Anisops fieberi Kirkaldy.

Anisops niveus Fieber (*nec* Fabricius), *Abh. böhm. Gesel. Wiss.*, Prague, (5), vii, p. 484, 1852; Matsumura, *Trans. Sapporo Nat. Hist. Soc.*, i, p. 28, 1906; Esaki, *Ent. Mag.*, Kyoto, i, p. 31, 1915.

Anisops fieberi Kirkaldy,‡ *Entomologist*, xxxiv, p. 5, 1901; *Wien. Ent. Zeit.*, xxiii, p. 116, 1904; Distant, *Faun. Brit. Ind., Rhynch.*, iii, p. 46, 1906; Hale, *Record. S. Austral. Mus.*, ii, p. 400, fig. 363, 1923; *Arkiv Zool.*, Stockholm, xvii, A, no. 20, p. 17, 1925; Esaki, *Ann. Mus. Nation. Hungar.*, xxiv, p. 188, 1926.

Anisops kuroiwae Matsumura, *Ent. Mag.*, Kyoto, i, p. 109, pl. iii, fig. 3, 1915 (*Syn. nov.*).

former. It may also be pointed out here that a Malayan cicadid, *Cryptotympana aquila* (Walker) was originally described by Walker (List Homop., i, p. 84, 1850) from a specimen from "Corea." The type is still preserved in the British Museum, and the label refers the specimen to the same source as the specimens of *Peltopterus macrothorax* from "Corea" mentioned above. It is, therefore, very reasonable to suppose that this specimen was also collected on "Madgico-sima" or Yayeyama Islands instead of Corea, though there are no further data on the label, since, judging by the distributive range of this species (known to include the Malay Peninsula, Borneo, Sumatra and Java), it is almost impossible to believe that the specimen was actually collected in Corea, as has already been doubted by several authors (*e.g.* Moulton, *Journ. Feder. Malay Stat. Mus.*, xi, pp. 138 and 169, 1923). This species also has recently been recorded from Formosa, though I have not seen the actual specimen (*cf.* Kato, *Trans. Nat. Hist. Soc. Formosa*, xvii, p. 23, 1927).

* *Meddel. Göteborgs Mus. Zool. Afdel.* 4 (*Göteborgs Kungl. Vetenskaps- och Vitterhetssamhälles Handlingar*, xvi, no. 2), p. 15, 1914.

† For *Anisops*, see *Wien. Ent. Zeit.*, xxiii, pp. 111–119, 1904.—T.E.

‡ Kirkaldy bestowed this new name upon *A. niveus* Fieber, on the assumption that this species was not identical with *A. niveus* (Fabricius) (*Syst. Ent.*, p. 690, 1775). In the opinion of the author in question, *Notonecla ciliata* Fabricius (*Ent. Syst., Suppl.*, p. 52, 1798) and *Anisops hyalinus*

Upolu : Mulifanua, 2 ♂♂, 3 ♀♀, 9.xi.1925.

Previously known to occur in India, Ceylon, Celebes, New Guinea, N. Australia, Formosa, and Loo Choo.

Anisops kuroiwae Matsumura is identical with *A. fieberi*. Matsumura says that *A. kuroiwae* is distinctly larger (" deutlich grösser ") than *A. fieberi*, but the former is " 6–6·5 mm." in length, whereas *A. fieberi* measures 4·9–7·2 mm., generally 6·5–7 mm. (Fieber's measurements, " $3\frac{1}{3}$ " lines for ♂ and ♀, practically = 7 mm.). As a matter of fact I have seen many specimens from Formosa and the Loo Choo Is., in both of which localities individuals forming part of Matsumura's typical series of *A. kuroiwae* were obtained, but no differences were observed between them and examples collected elsewhere.

9. Anisops cleopatra Distant. Text-fig. 5.

Anisops cleopatra Distant, Sarasin and Roux, *Nova Caledonia, Zool.*, i, pt. 4, no. 10, p. 386, pl. xi, fig. 8, 1914.

Upolu : Laulii, 5 specimens, 21.i.1925 ; Apia, 16 specimens, i.1924, 3 specimens, 19.vi.1924 ; Malololelei, 4 specimens, 9.vi.1924 ; Mulifanua, 2 specimens, 9.xi.1925. Also 1 specimen, " Samoa," 1920 (O'Connor).

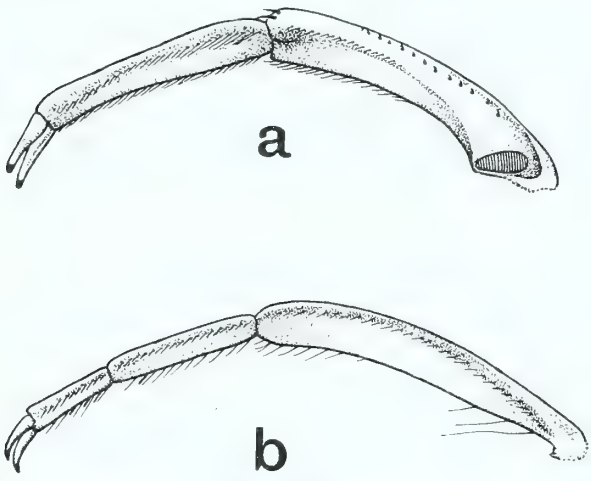
This species was hitherto known only from specimens from New Caledonia. The description by Distant, though accompanied by a beautiful drawing, is very insufficient. The type is not to be found in the British Museum, which however possesses the types of some other species described in the same paper. But there are two specimens * from New Caledonia (J. J. Walker) in the

Fieber (*Abh. böhm. Gesel. Wiss.*, Prague, (5), vii, p. 482, 1852) are identical with *Anisops niveus* (Fabricius) (*cf.* Kirkaldy, *Ann. Soc. Ent. France*, lxviii, p. 106, 1899). All these theories, however, were based on the "type" of *Notonecta nivea* Fabricius, which was said to be preserved in the British Museum (Kirkaldy, *Wien., Ent. Zeit.*, xxiii, p. 119, 1904). But although a Fabrician specimen, which is identical with *A. niveus* auct., and was determined by Fabricius as " *nivea* " is contained in the British Museum (Banks's Collection), it is not the type of *A. niveus*, because the species was described from specimens in the collection of D. Koenig. The real types (two specimens) are now kept in the Zoological Museum of the University of Kiel, and seem to represent a different species from *A. niveus* auct. Even *A. niveus* auct., which is known to be widely distributed throughout Southern Asia and Central and Southern Africa, seems to be a composite species, as has already been suggested by Hutchinson (*Ann. Mag. Nat. Hist.*, (10), i, p. 164, 1928). If the Fabrician types and Fieber's types in the Zoological Museum of the University of Berlin could be carefully studied, some changes in the nomenclature of this genus would undoubtedly become necessary.

* These specimens were identified by H. M. Hale as " *Anisops doris* Kirkaldy," but *A. doris* is much larger than this species (" ♂ $8\frac{1}{2}$–9 mm., ♀ 8–$9\frac{1}{4}$ mm."—Kirkaldy, *Wien. Ent. Zeit.*, xxiii,

collection, one of which at least agrees very well with Distant's description and figure, while the other is not quite identical in the colour of the scutellum. The latter character is very variable in many species of the genus.

Comparing the specimens from Samoa with those from New Caledonia I have identified them as *Anisops cleopatra* Distant. I give below some average measurements of the specimens to facilitate the identification of the species. (30 units = 1 mm.)



TEXT-FIG. 5.—*Anisops cleopatra* Distant. *a*, anterior tibia and tarsus of ♂; *b*, the same of ♀.

Length of body: ♂ 5·5 mm., ♀ 6 mm.
Breadth of vertex at the anterior margin viewed from above: ♂ 6 units, ♀ 8 units.
Breadth of synthlipsis: ♂ 3 units, ♀ 4 units.
Anterior tibia: ♂ 31 units, ♀ 30 units.
Anterior tarsus: ♂ 20 units, ♀ 14+9 units.
Intermediate tibia: ♂ 33 units, ♀ 33 units.
Intermediate tarsus: ♂ 15+11 units, ♀ 16+12 units.
Posterior tibia: ♂ 50 units, ♀ 53 units.
Posterior tarsus: ♂ 19+21 units, ♀ 20+24 units.

10. Anisops leucothea, sp. n. Text-fig. 6.

♂♀. Shining, pale sordid yellow or pale sordid brown like many other species of *Anisops*. Eyes pale brown. Base of scutellum more or less obscurely dark. Under side of abdomen black.

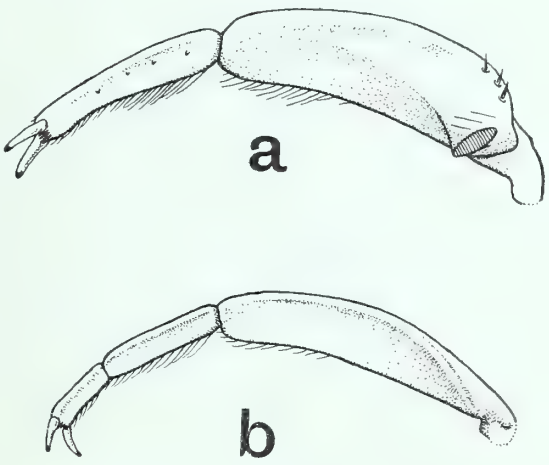
Head including eyes slightly broader than pronotum in ♂ and slightly narrower in ♀, with a short median groove in middle of vertex.* Vertex narrowed posteriorly, more divergent anteriorly in ♀ than in ♂. Breadth of vertex at the anterior margin seen from above: synthlipsis = 7 : 5 in ♂, 9 : 5 in ♀. Eyes more prominent in ♂ than in ♀. Pronotum much longer than head seen above, anterior margin more convexly sinuate than posterior margin. Scutellum

p. 112, 1904), and the eyes in the ♂, contrary to what is the case in the present species, almost touch each other at the base ("am Grunde fast zusammenstossend," Kirkaldy, *loc. cit.*).

* The term "vertex" (Kirkaldy, 1904) is equivalent to "notocephalon" (Kirkaldy, 1897). See Kirkaldy, *Wien. Ent. Zeit.*, xxiii, p. 93, 1904.

broader than long, about one and a third times as long as pronotum in both sexes. Shape of the anterior tibia and tarsus in both sexes is as shown in the text-fig. 6. Average dimensions : (30 units = 1 mm.).

Length of body : ♂ 8 mm., ♀ 8 mm.
Breadth of body : ♂ 1·9 mm., ♀ 2·1 mm.
Breadth of vertex at anterior margin, seen from above : ♂ 7 units, ♀ 9 units.
Breadth of synthlipsis : ♂ 5 units, ♀ 5 units.
Length of head : ♂ 23 units, ♀ 20 units.
Length of pronotum : ♂ 33 units, ♀ 31 units.
Anterior femur : ♂ 35 units, ♀ 34 units.
Anterior tibia : ♂ 44 units, ♀ 44 units.
Anterior tarsus : ♂ 27 units, ♀ 17+10 units.
Intermediate femur : ♂ 48 units, ♀ 47 units.
Intermediate tibia : ♂ 45 units, ♀ 44 units.
Intermediate tarsus : ♂ 20+14 units, ♀ 20 +15 units.
Posterior femur : ♂ 75 units, ♀ 73 units.
Posterior tibia : ♂ 63 units, ♀ 63 units.
Posterior tarsus : ♂ 20+25 units, ♀ 22+ 25 units.



TEXT-FIG. 6.—*Anisops leucothea* Esaki, sp. n. *a*, anterior tibia and tarsus of ♂; *b*, the same of ♀.

Upolu : Mulifanua, type ♂, type ♀, 6 ♂♂, 8 ♀♀, paratypes, 9.xi.1925.

In general appearance, this species is very similar to *Anisops assimilis* B. White, of New Zealand, but differs in having a shorter pronotum. The following measurements are taken from the types of *Anisops assimilis* B. White, which are now preserved in the Perthshire Natural History and Antiquarian Museum, Perth. (30 units = 1 mm.)

Length of body : ♂ 6·5 mm., ♀ 8 mm.
Breadth of vertex at the anterior margin seen above : ♂ 11 units, ♀ 9 units.
Breadth of synthlipsis : ♂ 7 units, ♀ 5 units.
Length of head : ♂ 25 units, ♀ 17 units.
Length of pronotum : ♂ 42 units, ♀ 33 units.
Anterior tibia : ♂ 40 units, ♀ 30 units.
Anterior tarsus : ♂ 45 units, ♀ 19+10 units.

In *A. assimilis*, the head and pronotum are comparatively much wider in the ♂ than in the ♀, but there is apparently no distinct sexual difference in the ratio between the breadth of the anterior margin of the vertex and the synthlipsis, as in *A. leucothea* : the ratios are as follows :

A. assimilis : ♂ 11 : 7, ♀ 9 : 5.[1] *A. leucothea* : ♂ 7 : 5, ♀ 9 : 5.

LIST OF TEXT-FIGURES.

Text-fig. 1. *Microvelia samoana* Esaki, sp. n., ♂.

,, 2. Ventral view of the genital segments of *Limnogonus* species, shown upside down, semi-diagrammatic.
a, *Limnogonus luctuosus* (Montrouzier), ♂.
b, ,, ,, ♀.
c, *Limnogonus pacificus* Esaki, sp. n., ♂.
d, ,, ,, ♀.
e, *Limnogonus fossarum* (Fabricius), ♂.
f, ,, ,, ♀.

,, 3. *Limnogonus buxtoni* Esaki, sp. n. *a*, ♂, dorsal view; *b*, antenna; *c*, ♂, genital segments, ventral view, shown upside down; *d*, the same of ♀.

,, 4. *Limnogonus hopkinsi* Esaki, sp. n. *a*, antenna; *b*, ♂ genital segments, ventral view, shown upside down; *c*, the same of ♀.

,, 5. *Anisops cleopatra* Distant. *a*, anterior tibia and tarsus of ♂; *b*, the same of ♀.

,, 6. *Anisops leucothea* Esaki, sp. n. *a*, anterior tibia and tarsus of ♂; *b*, the same of ♀.

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INSECTS OF SAMOA
AND OTHER SAMOAN TERRESTRIAL ARTHROPODA

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„ II. Hemiptera.
„ III. Lepidoptera.
„ IV. Coleoptera.
„ V. Hymenoptera.
„ VI. Diptera.
„ VII. Other Orders of Insects.
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AND OTHER SAMOAN TERRESTRIAL ARTHROPODA

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